

WHAT IS CLAIMED IS:

- 1 1. A writing instrument comprising:
  - 2 a barrel having a proximal end with a proximal opening and distal end with a
  - 3 writing end opening;
  - 4 a cartridge positioned in said barrel and having a writing tip extending out said
  - 5 writing end opening;
  - 6 an end plug in said proximal opening; and
  - 7 a cushioning element formed integrally and as a single piece with said end
  - 8 plug;
  - 9 wherein said cushioning element abuts said cartridge.
- 1 2. The writing instrument of claim 1, wherein said end plug is attached to said barrel.
- 1 3. The writing instrument of claim 2, wherein said end plug is attached to said  
2 proximal opening of said barrel by an adjustable threaded attachment.
- 1 4. The writing instrument of claim 2, wherein said end plug is permanently attached  
2 to said proximal opening of said barrel.
- 1 5. The writing instrument of claim 3, wherein said end plug is ultrasonically welded  
2 to said proximal opening.
- 1 6. The writing instrument of claim 1, wherein said cushioning element is spring-  
2 shaped.
- 1 7. The writing instrument of claim 1, wherein said cushioning element holds said  
2 cartridge.
- 1 8. The writing instrument of claim 1, wherein said cushioning element further  
2 comprises a hole to allow venting.
- 1 9. An end plug for use in a writing instrument, said end plug comprising:
  - 2 an end cap; and
  - 3 a cushioning element formed integrally as a single piece with said end cap.

- 1 10. The end plug of claim 9, wherein said end plug is made of a thermoplastic  
2 polymer.
- 1 11. The end plug of claim 9, wherein said cushioning element is a spring.
- 1 12. The end plug of claim 11, wherein said spring is configured to be injection  
2 moldable.
- 1 13. The end plug of claim 11, wherein said spring is configured such that the spring  
2 has a spring force of about 0.45 kg/mm of axial deflection.
- 1 14. A method of manufacturing an end plug with an integral cushioning element, said  
2 method comprising:  
3 bringing together two mold halves, each mold half comprising mold cavities  
4 for forming the end plug with an integral cushioning element, to mate the cavities  
5 with each other;  
6 inserting a pin into the mold halves;  
7 injecting flowable material into the mated mold halves; and  
8 removing the formed end plug with integral cushioning element from the  
9 mold.
- 1 15. The method of claim 14, further comprising forming the integral cushioning  
2 element in the form of a spring.
- 1 16. The method of claim 14, wherein injecting flowable material into the mated mold  
2 halves further comprises injecting a molten material.
- 1 17. A writing instrument comprising:  
2 a plurality of components; and  
3 a cushioning element formed integrally with one of said components during  
4 formation of at least one of said cushioning elements and said one of said  
5 components;

6            wherein a writing element is held by said cushioning element.

1    18. The writing instrument of claim 17, further comprising:

2            a barrel having a distal end, a proximal end, and a writing end opening in said  
3    distal end;

4            wherein said cushioning element is formed integrally with said barrel.

1    19. The writing instrument of claim 17, further comprising:

2            a barrel having a distal end and a proximal end; and

3            a front nose cone at said distal end of said barrel and having a writing end  
4    opening;

5            wherein said cushioning element is formed integrally with said front nose  
6    cone.

1    20. A writing instrument comprising:

2            a barrel having a proximal end with a proximal opening and a distal end with a  
3    writing end opening;

4            a cartridge in said barrel having a writing tip extending out said writing end  
5    opening;

6            an end plug in said proximal opening; and

7            a cushioning element formed integrally with said end plug;

8            wherein said cartridge is held by said cushioning element.

1    21. The writing instrument of claim 20, wherein said cushioning element is composed

2    of a different material than the material of said end plug.

1    22. A method of manufacturing a writing instrument, said method comprising:

2            forming an end plug with an integrally formed cushioning element in a mold  
3    such that the end plug cushioning element are coupled together by said forming; and

4            coupling the end plug to a writing instrument barrel such that a cartridge in  
5    said writing instrument barrel abuts said cushioning element.

1    23. The method of claim 22, further comprising the steps of:

2           forming the cushioning element;  
3           positioning the cushioning element between two mold halves, each mold half  
4 comprising mold cavities for forming an end plug;  
5           bringing together the mold halves to mate the cavities with each other, so that  
6 at least part of the cushioning element is positioned in said cavities;  
7           injecting flowable material into said mated mold halves to form the end plug;  
8 and  
9           removing the formed end plug with integral cushioning element from the  
10 mold.

1   24. The method of claim 22, further comprising permanently attaching the formed end  
2 plug with integral cushioning element to a writing instrument barrel.

1   25. The method of claim 22, further comprising forming the end plug and the  
2 cushioning element from different materials.

1   26. A writing instrument comprising:  
2           a barrel having a proximal end and a distal end with a writing end opening;  
3           a cartridge positioned in said barrel and having a writing tip extending out said  
4 writing end opening and a proximal end;  
5           a cushioning element in the form of a coil spring abutting said cartridge and  
6 permitting axial movement of said cartridge within said barrel upon compression of  
7 said cushioning element by said cartridge during writing; and  
8           a stop element extending through said cushioning element and affecting  
9 compression of said cushioning element once said cushioning element is compressed  
10 a predetermined extent.

1   27. The writing instrument of claim 26, wherein:  
2           a proximal opening is defined in said proximal end of said barrel;  
3           said writing instrument further comprises an end button positioned in said  
4 proximal opening in said barrel; and  
5           said cushioning element is positioned between said end button and said  
6 proximal end of said cartridge.

1 28. The writing instrument of claim 27, wherein:  
2 a longitudinal channel is defined in said end button and has a closed proximal  
3 end;  
4 said stop element extends through said longitudinal channel in said end button;  
5 and  
6 a gap is left between said stop element and said closed proximal end of said  
7 longitudinal channel in said end button when said cushioning element is in a neutral  
8 position.

1 29. The writing instrument of claim 26, wherein said stop element is formed from a  
2 material that inhibits, but does not prevent, further compression of said cushioning  
3 element once said cushioning element is compressed to said predetermined extent.

1 30. The writing instrument of claim 26, wherein said stop element is formed from a  
2 material that prevents further compression of said cushioning element once said  
3 cushioning element is compressed to said predetermined extent.

1 31. A writing instrument comprising:  
2 a barrel having a proximal end and a distal end with a writing end opening;  
3 a cartridge positioned in said barrel and having a writing tip extending out said  
4 writing end opening and a proximal end; and  
5 a cushioning element having a variable spring rate and permitting axial  
6 movement of said cartridge within said barrel upon compression of said cushioning  
7 element by said cartridge during writing.

1 32. The writing instrument of claim 31, wherein:  
2 a proximal opening is defined in said proximal end of said barrel;  
3 said writing instrument further comprises an end button positioned in said  
4 proximal opening in said barrel; and  
5 said cushioning element is positioned between said end button and said  
6 proximal end of said cartridge.

33. The writing instrument of claim 31, wherein said cushioning element is in the form of a coil spring with coils set at varying distances to result in the variable spring rate.